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PATENT

Docket No. SJO920000065US1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Vladimir Nikitin et al.)
Serial No.: 10/087,332)
Filed: March 1, 2002) Group Art
For: **REDUCTION OF INTERFERENCE PICKUP IN**) Unit: 2652
HEADS FOR MAGNETIC RECORDING BY)
MINIMIZING PARASITIC CAPACITANCE)
Examiner: Davis, Donald D.)

APPELLANTS' AMENDED APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The USPTO received Appellants' timely Notice of Appeal on June 25, 2004. The Notice of Appeal was filed in response to the Final Office Action mailed March 24, 2004. Appellants appeal the rejection of all pending claims.

The original Appeal Brief was filed in triplicate under the provisions of 37 C.F.R. § 1.192 on September 30, 2004. This Amended Appeal Brief removes the grouping of the claims section and revises certain section headings and numbering, as discussed with the Examiner via telephone on February 17, 2005. Applicant has also taken the opportunity to place this Amended Appeal Brief in compliance with 37 C.F.R. § 41.37. The filing fee set forth in 37 C.F.R. § 1.17(c) of \$330.00 was previously submitted. The Commissioner is hereby authorized to charge payment of any additional fees associated with this communication, or to credit any overpayment, to Deposit Account No. 09-0466.

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facie case of obviousness with respect to independent claim 22. Therefore, Appellants submit that independent claim 22 is patentable over the cited references.

SUMMARY

In view of the foregoing, each of the claims on appeal has been improperly rejected because the Examiner has not properly established a *prima facie* case of obviousness for claims 1-25. Appellants submit that the foregoing arguments establish the non-obviousness of the claims of the present application. Therefore, Appellants respectfully request reversal of the Examiner's rejection under 35 U.S.C. § 103(a) and allowance of pending claims 1-25.

Respectfully submitted,



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22, which includes a similar limitation.

1. REAL PARTY IN INTEREST

The real party in interest is the assignee, International Business Machines Corporation, Armonk, New York.

2. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

3. STATUS OF CLAIMS

The Final Office Action rejected claims 1-25 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,807,073 to Takeura et al. (hereinafter "Takeura") in view of U.S. Patent No. 5,048,175 to Jurisch et al. (hereinafter "Jurisch").

4. STATUS OF AMENDMENTS

Appellants filed an amendment subsequent to receipt of the final rejection. The amendment was entered for purposes of this appeal, as noted in the Advisory Action mailed June 16, 2004. A copy of the claims is included in section 9, Claim Appendix.

Upon further review, and with the approval of the Examiner, Applicant submits a proposed amendment herewith for consideration. With the proposed amendment, claim 15 reads better in light of the independent claim 1 from which claim 15 depends. In particular, the proposed amendment amends claim 15 to replace "~~Further comprising an electrical contact having~~" with "wherein the electrical contact has." A copy of the claims with this proposed amendment is included in section 10, Proposed Claim Amendment Appendix.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Magnetoresistive (MR) and giant magnetoresistive (GMR) heads used in data storage drives may be subject to interference noise. This noise may reduce the quality of the data read from a tape storage device or a hard disk drive. As the interference noise increases, the signal-to-noise ratio (SNR) decreases and the quality of the detected read signal decreases. *See*, Background, pages 1-2. The interference noise may be due, at least in part, to ambient radio

frequency (RF) energy, which may originate from external (e.g., radio and/or television station broadcasts) or internal (e.g., storage drive motors and/or electronics) sources. Summary, page 4, lines 7-15. Various embodiment disclosed in the present application reduce the effects of interference noise by reducing the capacitance of various head elements within a storage drive. Summary, page 4, lines 16-19.

One embodiment includes a magnetic head 600 having a material 602, which has a low dielectric constant, interposed between a substrate 614 and an electrical contact pad 610. The electrical contact pads 610 are the read and write elements through which a storage drive reads and writes data to/from the storage device. The low dielectric material 602 reduces the parasitic capacitive coupling between the substrate 614 and the contact pad 610, thereby improving the quality of the signal at the contact pad 610. Detailed Description, page 10, line 26 through page 11, line 12. In particular, independent claim 1 recites an electrical contact pad, a substrate, an insulating undercoat, and a low dielectric material. The electrical contact pad 610 represents one embodiment of the electrical contact pad recited in claim 1. The substrate 614 represents one embodiment of the substrate recited in claim 1. The insulating undercoat 608 represents one embodiment of the insulating undercoat recited in claim 1. The low dielectric material 602 represents one embodiment of the low dielectric material recited in claim 1.

Another embodiment includes a magnetic head 600 having a contact pad 610 of a reduced size. The reduced surface area of the contact pad 610 minimizes the parasitic capacitance between the substrate 614 and the contact pad 610. Detailed Description, page 10, lines 5-14. In particular, claim 22 recites a substrate and a contact pad of reduced size. The substrate 614 represents one embodiment of the substrate recited in claim 22. The electrical contact pad 610 represents one embodiment of the contact pad recited in claim 22.

Another embodiment includes a magnetic head 600 having a contact pad 610 that is separated from the substrate 614 by an insulating undercoat 608 of increased thickness. Detailed Description, page 10, lines 15-22. In particular, claim 24 recites a substrate, an insulating undercoat layer, an electrical contact pad, and another layer of SiO₂. The substrate 614 represents one embodiment of the substrate recited in claim 24. The insulating undercoat 608 represents one embodiment of the insulating undercoat layer and the additional layer of SiO₂

recited in claim 24. The electrical contact pad 610 represents one embodiment of the electrical contact pad recited in claim 22.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

I. Whether the Examiner failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a) for claims 1-25 where the limitations of the claims are not taught or suggested within the combination of cited references?

7. ARGUMENT

I. The Examiner failed to establish a *prima facie* case of obviousness because the cited references, either alone or in combination, do not teach or suggest all of the limitations of claims 1-25.

Appellants respectfully assert that neither Takeura nor Jurisch, alone or in combination, teaches or suggests the low dielectric material (or material selected to have a low dielectric, or species thereof) claimed in independent claims 1, 16, 17, 23, 24, and 25 of the present application.

The Advisory Action dated June 16, 2004 states that the final rejection of record is maintained, but states no further reasoning in support of the final rejection. The Final Office Action states:

Takeura et al shows in figure 5 a magnetic head including an electrical contact pad 3; a substrate 14 on which the magnetic head is formed; and **an insulating undercoat 13** interposed between the pad and the substrate 14. The **low dielectric material 13** of Takeura et al is configured to decrease the parasitic capacitance of the magnetic head.

Final Office Action, 03/24/04, page 2 (emphasis added). The Final Office Action also states:

However, Takeura et al is **silent as to dielectric material** and electrical conductive (e.g. copper, Cu) studs formed through dielectric material.

Final Office Action, 03/24/04, page 3 (emphasis added).

These two statements within the Final Office Action are inconsistent. It is impossible for Takeura to both disclose a low dielectric material and be silent as to the low dielectric material. Appellants agree with the Examiner's second statement—that Takeura is silent as to the low dielectric material claimed in the present application. It appears that the first statement—that Takeura discloses a low dielectric material—is a “leftover” from the first Office Action mailed on September 30, 2003.¹

However, if the Examiner asserts that Takeura discloses both an insulating undercoat 13 and a low dielectric material 13, Appellants respectfully disagree with the Examiner's mischaracterization of the cited reference. As stated in previous responses to the first and Final Office Actions, Takeura discloses only an insulating film 13. Takeura, col. 7, line 64 through col. 8, line 3; fig. 5. Takeura only discloses a single layer. If Takeura were to disclose the insulating film 13 as the low dielectric material claimed in the present application, then Takeura provides no disclosure of the claimed insulating undercoat. Alternately, if the insulating film 13 in Takeura were the claimed insulating undercoat of the present invention, Takeura fails to disclose the claimed low dielectric material.

It may be that the examiner considers the insulating film 13 of Takeura to serve as both of these layers. Nevertheless, Takeura's teachings are insufficient to teach the entirety of the claim 1, as required for a *prima facie* case of obviousness. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1576 (Fed. Cir. 1987). The insulating undercoat, as shown in Figure 6 of the present application, serves to insulate the active elements of the magnetic head. As such, it is formed under the active components of the magnetic head. Detailed Description, page 7, lines 13-17. In contrast, the low dielectric material is interposed between the pad and the insulating undercoat. Consequently, the low dielectric material forms a separate layer from the insulating undercoat. The insulating film 13 disclosed in Takeura cannot be interpreted as both the insulating undercoat and the low dielectric material interposed between the contact pads and the insulating undercoat. A single layer cannot be interposed between itself and another layer.

¹ Language similar to the first statement was employed in a rejection of claims 1, 2, 6, 7, 14, and 23-25 under 35 U.S.C. § 102 (b) in the first Office Action dated September 30, 2003. The Examiner subsequently withdrew the rejection under 35 U.S.C. § 102(b), but apparently left substantially similar language in the Final Office Action, even though no rejection is presented under 35 U.S.C. § 102(b).

Therefore, Takeura fails to disclose all of the features of claim 1 and the Examiner fails to establish a *prima facie* case of obviousness based on the disclosure of Takeura alone. Appellants believe that the Examiner acknowledges this through the Examiner's second, more recent statement that Takeura is silent as to the low dielectric material of the present application. Nevertheless, in order to ensure a complete response, Appellants respectfully reassert that Takeura fails to disclose this claim limitation.

With regard to the combined references, the Final Office Action states:

Jurisch et al shows in figure 1, for example, electrical conductive, such as copper (see column 5, lines 44-45) studs formed through **dielectric material**. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide the magnetic head of Takeura et al with electrical conductive (e.g. Cu) studs formed through **dielectric material as taught by Jurisch et al**.

Final Office Action, 03/24/04, pages 3-4 (emphasis added).

Again, Appellants respectfully disagree with the Examiner's mischaracterization of the cited reference. Jurisch does not teach or suggest a low dielectric material as claimed in the present application. Rather Jurisch discloses a thin film magnetic head 10 having a substrate 12 and a core 14. Jurisch, col. 2, lines 33-35; fig. 1. The substrate 12 and core 14 are separated by a single insulating base coat 36. Jurisch, col. 2, lines 54-55; fig. 1. A conductive stud 40 extends through the base coat 36 between the substrate 12 and the core 14, forming an electrical circuit between the substrate 12 and the core 14. Jurisch, col. 2, lines 63-68.

Although the Examiner fails to explicitly point out which teaching of Jurisch discloses the low dielectric material of the present application, it appears that the Examiner considers the base coat 36, through which the stud 40 extends, to be the same as the low dielectric material claimed in the present application. If any comparison is to be made between Jurisch and the present application, the base coat 36 is potentially more similar to the insulating undercoat of the present application than it is to the low dielectric material. Even if the base coat 36 of Jurisch were identical to the insulating undercoat claimed in the present application, Jurisch provides no disclosure of the claimed low dielectric material interposed between the electrical contact pad and the insulating undercoat. Alternately, if the base coat 36 in Jurisch were the claimed low dielectric material of the present invention, Jurisch fails to disclose the claimed insulating

undercoat. Jurisch simply does not disclose a low dielectric material separate from the base coat 36. Jurisch, like Takeura, discloses only a single layer. Therefore, the combination of the base coat 36 of Jurisch and the teachings of Takeura are insufficient to establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a).

Given that a rejection under 35 U.S.C. § 103(a) is only appropriate where all of the claim limitations are taught or suggested by the cited references, according to MPEP § 2143.03, and the Examiner has not shown that the cited references teach or suggest all of the claim limitations, Appellants respectfully assert that claim 1 is patentable over the combination of cited references. Appellants also submit that independent claims 16, 17, 23, 24, and 25 are patentable because each of these claims contains a similar limitation and/or recites further limitations not disclosed or taught by the cited references.

Specifically, claim 16 recites certain characteristics of the claimed low dielectric material. Claim 16 also recites a conducting stud formed through the low dielectric material to make electrical connection between the electrical contact pad and the insulating layer. Appellants respectfully submit that the Office Action's assertions are erroneous that Jurisch teaches a conductive stud as claimed. Rather Jurisch teaches a conductive stud 40 extending through the base coat 36 between the base substrate 12 and the core 14. Jurisch, col. 2, lines 63-68; fig. 1. Jurisch does not teach the conductive stud 40 between an electrical contact pad and an insulating layer.

Claim 17 recites all of the limitations of claim 1, as well as a magnetic recording disk, a spin-valve sensor, an actuator, and a detector electrically coupled to the spin-valve sensor. Although the Examiner states that it would have been obvious to provide the magnetic head of Takeura with a GMR sensor, it is not apparent where the Examiner is finding support that the inductive read write head of Jurisch could be combined with the MR head of Takeura to form a GMR head having the specific configuration of claim 17. Furthermore, the Examiner makes no effort to establish the source of disclosure or ordinary skill that would render obvious the magnetic recording disk, the actuator, or the detector electrically coupled to the spin-valve sensor, either individually or in combination with each other and the other limitations of claim 17.

Claim 23 recites a species of the magnetic head of claim 1. In particular, claim 23 recites an alumina undercoat layer and a layer of alumina interposed between the electrical contact pad and the alumina undercoat layer.

Claim 24 also recites a species of the magnetic head of claim 1. In particular, claim 24 recites an insulating undercoat layer comprising SiO₂ and a layer of SiO₂ interposed between the electrical contact pad and the insulating undercoat layer.

Claim 25 recites a method of reducing capacitance in a magnetic head that includes providing many of the components recited in claim 1. In particular, claim 25 recites providing a substrate, an insulating layer, a read/write head, and a material selected to have a low dielectric constant between the pad and the insulating layer. The Examiner fails to provide any references or information that would render the method of claim 25 obvious.

Given that independent claims 1, 16, 17, 23, 24, and 25 are patentable, Appellants respectfully assert that dependent claims 2-15 and 18-21 are also patentable as depending from independent claims 1 and 17, respectfully. Additionally, these dependent claims are further considered allowable on their own merits as they recite other features which are neither taught nor suggested by the applied references.

Regarding the rejection of claim 2, the Examiner conclusively states that the low dielectric material 13 of Takeura is configured *to decrease the parasitic capacitance of the magnetic head*. Final Office Action, 03/24/04, page 2 (emphasis added). Yet, Takeura makes no reference to providing the layer 13 to reduce parasitic capacitance. In fact, Takeura is directed to a different problem than the present invention. Takeura attempts to reduce thermal noise and therefore increases the signal-to-noise ratio. Takeura, col. 1, lines 40-42; col. 2, lines 31-35. Takeura does this by reducing the second gap. Takeura, col. 1, line 62 through col. 2, line 1. Jurisch is also directed to a different problem. Jurisch teaches that stray capacitance is reduced by shorting the substrate 12 and the core 14. Nevertheless, this does not solve the problem of the present invention of stray capacitance between the contacts 610 and the substrate 614. Indeed, nowhere does Takeura or Jurisch state that a low dielectric material is used to decrease parasitic capacitance, as recited in claim 2.

With regard to the rejection of claim 3, Jurisch is cited for the prospect of a stud formed through the low dielectric material. As the claimed low dielectric material is interposed between

the underlayer and a contact pad, the stud 40 of Jurisch must pass through a low dielectric material that is different than an underlayer. Yet, the only stud 40 in Jurisch passes through the base coat layer 36, which is clearly an underlayer. It does not pass through any other layer.

Furthermore, the stud 40 of Jurisch is used for a different purpose than the stud recited in claim 3. The stud of claim 3 is used to increase the distance between the contact pads 610 and the substrate 614 and to allow the low dielectric material 602 to be interposed between the contacts 610 and the undercoat layer 608. The stud 40 of Jurisch is used to form a short circuit between the substrate 12 and the core 14. Jurisch col. 3, lines 63-67. Using the stud 40 of Jurisch to pass through the dielectric layer would destroy the utility of the present application, as it would cause a short between the contact lead and the active elements of the magnetic head to which the contact lead connects. Combining the teachings of Jurisch with Takeura would similarly destroy the utility of Takeura, which is an impermissible combination of references, as references are not properly combinable where a proposed modification would render one of the references unsuitable for its intended purpose. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). If the Examiner proposes passing the stud 40 through different layers from those shown in Jurisch, a proper teaching for doing so other than impermissible hindsight must be given.

Given that dependent claim 3 is patentable, Appellants respectfully assert that dependent claims 4 and 5 are also patentable as depending from dependent claim 3, which depends from patentable independent claim 1.

With regard to claim 6, the Examiner fails to cite any component in the prior art that teaches the use of hard-bake photoresist for use as the low dielectric material interposed between the contact pad and the insulating undercoat. The Examiner seems to state that this element is functional and can be dismissed. Nevertheless, photoresist is a definite structure and to claim photoresist is to claim a structure, not a function. To specifically claim hard-bake photoresist is merely a way to claim photoresist having a cured state. Doing so is once again defining structure because cured photoresist is a different structure from uncured photoresist. Yet, the Office Action does not make reference to photoresist of any type whatsoever and, consequently, has not made a proper *prima facie* case of obviousness for claim 6.

With regard to claim 7, the Office Action states that the low dielectric material is disclosed as being SiO₂. Nevertheless, the cited passage, col. 10, lines 52-55, refers to a first and second head gap, not to an equivalent of the recited claim limitation. In fact, the Examiner fails to provide any reference to a low dielectric material that comprises SiO₂. This failure is understandable given that the cited references, generally, do not disclose, teach, or suggest a low dielectric material as claimed in the present application, as described above.

Regarding claims 8-12, the Office Action states that it would have been obvious to have made the cited thickness and constant of the low dielectric material in order to provide a head that corresponds with the magnetization reversal interval. Final Office Action, 03/24/04, page 4. The Examiner cites Takeura, col. 3, lines 39-47. The cited reference, however, is inapplicable to the particular selections of thicknesses and dielectric constant of claims 8-12. No further explanation is provided by the Examiner.

Regarding claim 13, the Examiner fails to support the conclusion that the inductive read write head of Jurisch could be combined with the MR head of Takeura to form a GMR head having the specific configuration of claim 13.

With regard to claim 14, the Examiner fails to address the limitation that the low dielectric material provides a platform for the electrical contact pad. The Office Action does not have any references or offer any explanation addressing this limitation recited in claim 14.

Claim 15 has never been addressed by the Examiner. Claim 15 recites an electrical contact pad having a surface area of less than about 20 μm in order to reduce capacitance coupling with the substrate. Appellants noted in response to each of the first and Final Office Actions that the Examiner failed to assert any reasons for rejecting claim 15. Specifically, in response to the Final Office Action, Appellants stated, “[C]laim 15 has not been discussed in the office action, as was pointed out in the last response. Claim 15 is directed to the contact pad and recites a reduced area contact pad that reduces capacitance coupling with the substrate. Claim 15 is believed to be allowable, and no reasons for rejecting claim 15 have been given.” The Examiner failed to address claim 15 in the Final Office Action and no reason has ever been provided for the rejection.

Claim 18, which depends from independent claim 17, recites a stud formed through the low dielectric material. As discussed above, the stud 40 of Jurisch is dissimilar to the stud of the present application.

Claim 19 recites that the low dielectric material is configured to decrease the parasitic capacitance of the magnetic head. As discussed above, the cited references do not address disclose, teach, or suggest a low dielectric material to decrease capacitance, as recited in claim 19.

Claim 20 recites a thickness range of the low dielectric material. As discussed above, the Examiner fails to provide any relevant reference or explanation to support this rejection.

Claim 21 recites a GMR sensor. As discussed above, the Examiner fails to support the conclusion that the inductive read write head of Jurisch could be combined with the MR head of Takeura to form a GMR head having the specific configuration of claim 21.

Given that the Examiner fails to establish a *prima facie* case of obviousness for any of the independent claims 1, 16, 17, 23, 24, or 25 or the dependent claims 2-15 or 18-20, Appellants respectfully submit that claims 1-21 and 23-25 are patentable over the cited references.

Additionally, Appellants respectfully assert that neither Takeura nor Jurisch, alone or in combination, teaches or suggests the contact pad having a surface area less than about 20 μm as claimed in independent claim 22 of the present application.² The Examiner has simply not provided any prior art references or explanation with regard to the rejection of independent claim 22. The Final Office Action does state that it would have been obvious to specify the thickness of the dielectric material and contact pads (which statement Appellants submit is erroneous), but the Examiner never addresses the surface area of the contact pad. Given that the Office Action does not show any teaching or suggestions regarding the surface area dimensions within the applied references, Appellants respectfully assert that the Examiner failed to establish a *prima*

² A similar claim limitation is included in dependent claim 15, which depends from independent claim 1. As discussed previously in the body of this brief, Appellants noted in response to each of the first and Final Office Actions that the Examiner failed to assert any reasons for rejecting claim 15. Specifically, in response to the Final Office Action, Appellants stated, “[C]laim 15 has not been discussed in the office action, as was pointed out in the last response. Claim 15 is directed to the contact pad and recites a reduced area contact pad that reduces capacitance coupling with the substrate. Claim 15 is believed to be allowable, and no reasons for rejecting claim 15 have been given.” Similarly, Appellants respectfully submit that no reasons have been given for rejecting independent claim

8a. CLAIM APPENDIX

The claims involved in the appeal, namely claims 1-25, are listed below.

1. A magnetic head comprising:
an electrical contact pad;
a substrate on which the magnetic head is formed;
an insulating undercoat interposed between the pad and the substrate; and
a material selected to have a low dielectric constant interposed between the pad
and the insulating undercoat.
2. The magnetic head of claim 1, wherein the low dielectric material is configured to
decrease the parasitic capacitance of the magnetic head.
3. The magnetic head of claim 1, further comprising a stud formed through the low
dielectric material.
4. The magnetic head of claim 3, wherein the stud comprises Cu.
5. The magnetic head of claim 3, wherein the stud comprises a conductive material.
6. The magnetic head of claim 1, wherein the low dielectric material comprises hard-
bake photo resist.
7. The magnetic head of claim 1, wherein the low dielectric material comprises SiO₂.

8. The magnetic head of claim 1, wherein the low dielectric material has a thickness in a range of between about 1 μm and about 100 μm .

9. The magnetic head of claim 1, wherein the low dielectric material has a thickness in a range of between about 10 μm and about 50 μm .

10. The magnetic head of claim 1, wherein the low dielectric material has a thickness of about 20 μm .

11. The magnetic head of claim 1, wherein the low dielectric material has a dielectric constant of less than about 9.

12. The magnetic head of claim 1, wherein the low dielectric material has a dielectric constant of about 3.

13. The magnetic head of claim 1, wherein the magnetic head carries a GMR sensor.

14. The magnetic head of claim 1, wherein the low dielectric material provides a platform for the electrical contact pad.

15. The magnetic head of claim 1, Further comprising an electrical contact pad having a surface area of less than about 20 μm in order to reduce capacitance coupling with the substrate.

16. A reduced capacitance magnetic head comprising:
- an electrical contact pad;
 - a substrate on which the magnetic head is formed;
 - an insulating layer formed over the substrate;
 - a low dielectric material interposed between the pad and the substrate which is used as a platform for the electrical contact pad to increase the distance between the substrate and the electrical contact pad, the low dielectric material comprising hard bake photo resist and having a thickness of about 20 μm and a dielectric constant of about 3;
 - and
 - a conducting stud formed through the low dielectric material to make electrical connection between the electrical contact pad and the insulating layer.
17. A disk drive system, comprising:
- a reduced capacitance magnetic head comprising:
 - an electrical contact pad;
 - a substrate on which the magnetic head is formed;
 - an insulating undercoat interposed between the pad and the substrate;
 - a material selected to have a low dielectric constant interposed between the pad and the insulating undercoat; and
 - a magnetic recording disk;
 - a spin-valve sensor for reading data recorded on the recording disk; and
 - an actuator for moving the spin valve sensor across the magnetic recording disk in order for the spin-valve sensor to access different magnetically recorded data on the magnetic recording disk; and

a detector electrically coupled to the spin-valve sensor and configured to detect changes in resistance of the sensor caused by rotation of the magnetization of the sensing layer relative to the fixed magnetizations of the pinned layer in response to changing magnetic fields induced by the magnetically recorded data.

18. The disk drive system of claim 17, further comprising a stud formed through the low dielectric material.

19. The disk drive system of claim 17, wherein the low dielectric material is configured to decrease the parasitic capacitance of the magnetic head.

20. The disk drive system of claim 17, wherein the low dielectric material has a thickness in a range of between about 10 μm and about 50 μm .

21. The disk drive system of claim 17, wherein the magnetic head comprises a GMR sensor.

22. A reduced capacitance magnetic head comprising:
a substrate on which the magnetic head is formed; and
a contact pad disposed above the substrate and having a surface area less than about 20 μm in order to reduce capacitance coupling with the substrate.

23. A magnetic head comprising:
a substrate on which the magnetic head is formed;
an alumina undercoat layer comprising Al_2O_3 formed over the substrate;

an electrical contact pad; and
a layer of alumina interposed between the electrical contact pad and the alumina undercoat layer.

24. A magnetic head comprising:
a substrate on which the magnetic head is formed;
an insulating undercoat layer comprising SiO₂ formed over the substrate;
an electrical contact pad; and
a layer of SiO₂ interposed between the electrical contact pad and the insulating undercoat layer.

25. A method of reducing capacitance in a magnetic head, comprising:
providing a substrate;
providing an insulating layer directly over the substrate;
providing a read/write head; and
providing a material selected to have a low dielectric constant between the pad and the insulating layer for isolating the read/write head from the substrate in order to reduce the capacitance coupling between the read head and the substrate.

8b. PROPOSED AMENDMENT CLAIM APPENDIX

Please replace all prior versions and listings of the claims with the following listing of claims.

1. (Previously Presented) A magnetic head comprising:
an electrical contact pad;
a substrate on which the magnetic head is formed;
an insulating undercoat interposed between the pad and the substrate; and
a material selected to have a low dielectric constant interposed between the pad
and the insulating undercoat.
2. (Original) The magnetic head of claim 1, wherein the low dielectric material is
configured to decrease the parasitic capacitance of the magnetic head.
3. (Original) The magnetic head of claim 1, further comprising a stud formed
through the low dielectric material.
4. (Original) The magnetic head of claim 3, wherein the stud comprises Cu.
5. (Original) The magnetic head of claim 3, wherein the stud comprises a conductive
material.
6. (Original) The magnetic head of claim 1, wherein the low dielectric material
comprises hard-bake photo resist.
7. (Original) The magnetic head of claim 1, wherein the low dielectric material
comprises SiO₂.

8. (Original) The magnetic head of claim 1, wherein the low dielectric material has a thickness in a range of between about 1 μm and about 100 μm .

9. (Original) The magnetic head of claim 1, wherein the low dielectric material has a thickness in a range of between about 10 μm and about 50 μm .

10. (Original) The magnetic head of claim 1, wherein the low dielectric material has a thickness of about 20 μm .

11. (Original) The magnetic head of claim 1, wherein the low dielectric material has a dielectric constant of less than about 9.

12. (Original) The magnetic head of claim 1, wherein the low dielectric material has a dielectric constant of about 3.

13. (Original) The magnetic head of claim 1, wherein the magnetic head carries a GMR sensor.

14. (Original) The magnetic head of claim 1, wherein the low dielectric material provides a platform for the electrical contact pad.

15. (Currently Amended) The magnetic head of claim 1, ~~further comprising an~~ wherein the electrical contact pad ~~having has~~ a surface area of less than about 20 μm in order to reduce capacitance coupling with the substrate.

16. (Previously Presented) A reduced capacitance magnetic head comprising:
- an electrical contact pad;
 - a substrate on which the magnetic head is formed;
 - an insulating layer formed over the substrate;
 - a low dielectric material interposed between the pad and the substrate which is used as a platform for the electrical contact pad to increase the distance between the substrate and the electrical contact pad, the low dielectric material comprising hard bake photo resist and having a thickness of about 20 μm and a dielectric constant of about 3;
 - and
 - a conducting stud formed through the low dielectric material to make electrical connection between the electrical contact pad and the insulating layer.
17. (Previously Presented) A disk drive system, comprising:
- a reduced capacitance magnetic head comprising:
 - an electrical contact pad;
 - a substrate on which the magnetic head is formed;
 - an insulating undercoat interposed between the pad and the substrate;
 - a material selected to have a low dielectric constant interposed between the pad and the insulating undercoat; and
 - a magnetic recording disk;
 - a spin-valve sensor for reading data recorded on the recording disk; and
 - an actuator for moving the spin valve sensor across the magnetic recording disk in order for the spin-valve sensor to access different magnetically recorded data on the magnetic recording disk; and

a detector electrically coupled to the spin-valve sensor and configured to detect changes in resistance of the sensor caused by rotation of the magnetization of the sensing layer relative to the fixed magnetizations of the pinned layer in response to changing magnetic fields induced by the magnetically recorded data.

18. (Original) The disk drive system of claim 17, further comprising a stud formed through the low dielectric material.

19. (Original) The disk drive system of claim 17, wherein the low dielectric material is configured to decrease the parasitic capacitance of the magnetic head.

20. (Original) The disk drive system of claim 17, wherein the low dielectric material has a thickness in a range of between about 10 μm and about 50 μm .

21. (Original) The disk drive system of claim 17, wherein the magnetic head comprises a GMR sensor.

22. (Original) A reduced capacitance magnetic head comprising:
a substrate on which the magnetic head is formed; and
a contact pad disposed above the substrate and having a surface area less than about 20 μm in order to reduce capacitance coupling with the substrate.

23. (Original) A magnetic head comprising:
a substrate on which the magnetic head is formed;
an alumina undercoat layer comprising Al_2O_3 formed over the substrate;

an electrical contact pad; and
a layer of alumina interposed between the electrical contact pad and the alumina undercoat layer.

24. (Previously Presented) A magnetic head comprising:
a substrate on which the magnetic head is formed;
an insulating undercoat layer comprising SiO₂ formed over the substrate;
an electrical contact pad; and
a layer of SiO₂ interposed between the electrical contact pad and the insulating undercoat layer.

25. (Previously Presented) A method of reducing capacitance in a magnetic head, comprising:
providing a substrate;
providing an insulating layer directly over the substrate;
providing a read/write head; and
providing a material selected to have a low dielectric constant between the pad and the insulating layer for isolating the read/write head from the substrate in order to reduce the capacitance coupling between the read head and the substrate.